

Applicant : Arch Don et al.
Serial No. : 10-749,692
Filed : December 29, 2003
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Attorney's Docket No.: 07972-159001

Amendments to the Drawings:

Applicant requests the enclosed five sheets of formal drawings be substituted for the drawings presently in the application.

Attachments following last page of this Amendment:

Replacement Sheets (5 pages)

REMARKS

Claim amendments

Applicant amends claim 9 to correct a lack of antecedent basis for "I/O transaction."

Drawings

Applicant submits a formal drawing for Fig. 2.

Section 102 rejection of claim 1

A section 102 rejection requires that "each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."¹

In this case, *Kedem*² fails to teach claim 1's limitation of:

maintaining, at the data storage system, information identifying extents of the logical device that are designated for storage of database records;

The Examiner states that *Kedem* teaches the foregoing limitation in a discussion of a copy command for copying a particular file to a designated location:

"The requesting host application achieves this result by issuing a special copy command (e.g., a FILE SMMF command) that identifies a file in a source device, such as the file 36 and a destination for that file, such as the storage location 40 in the DEST A device 33."³

As a threshold matter, there is no teaching in *Kedem* that the file 36 is a database record. However, for the sake of argument, Applicant will assume that the file 36 could be a database record.

To the extent that the file 36 is a database record, Applicant concedes that *Kedem* would teach copying a data record to a location 40. But this hardly amounts to a teaching that somewhere in the *Kedem* system, there exists information identifying location 40 as being

¹ *Venergall Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987).

² *Kedem et al.*, U.S. Patent No. 6,363,385.

³ *Kedem*, col. 4, lines 17-21.

"designated for storage of database records." The cited text only teaches that a copy command exists. The fact that *Kedem* has a special FILE SMMF command certainly does not amount to a teaching or suggestion that *Kedem* also maintains "information identifying extents...designated for storage of database records."

Having established that *Kedem* fails to expressly teach "maintaining...information identifying extents...designated for storage of database records," we now turn to the question of whether such a disclosure is somehow inherent.

The Examiner seems to be assuming that as long as if there exists a copy command, there must also be something to ensure that one copies data only to locations specifically designated for that data. But this is a flawed assumption.

There are many copy commands that will copy indiscriminately. For example, both the UNIX "cp" command and the DOS "copy" command can copy data. But in neither case does anything prevent someone from copying data to an inappropriate location. Indeed, the ease with which one can copy data to incorrect places is familiar to many.

The fact that a computer system has a copy command hardly means that there must also exist information identifying locations designated for storage of particular kinds of data. Accordingly, "maintaining...information identifying extents...designated for storage of database records" cannot be regarded as somehow inherent in the disclosure of a copy command.

Kedem also fails to teach

"determining whether the target location is one on which a database record is permitted to be stored"

The Examiner states that *Kedem* teaches the foregoing limitation in a discussion of write-pending flags:

"An individual write pending slot, such as a write pending slot 44, includes a header 45 followed by the data in a data block 46. Normally this data block

will contain the data for one physical track. Each header 45 includes a WP flag 46 that indicates a need for write operations or destaging, of data from one of the write pending slots 42 to some location in a physical disk device. Once the data is transferred from the cache memory 27 to a corresponding data storage device, such as the source device 31, the system clears the WP bit 46 for that slot.”⁴

Kedem teaches temporarily storing data in a cache memory 27 that is separate from the logical volumes 31, 33, 35. This data is stored in cache slots in the cache memory 27. Each cache slot stores data that is later to be written to a track on a logical volume 31. The write operation to the logical volume 31 take place later, when the *Kedem* system has the time to carry it out.

The use of a cache memory 27 this way reduces the latency seen by a user because writing to cache memory 27 is faster than writing to a logical volume 31. From the user's point of view, the latency for execution of a write operation is only the time required to write to cache memory 27. The more time-consuming write to a logical device 31 occurs later, without the user's awareness.

Of course, what this means is that at any instant, some data in cache 27 will have already been copied to a logical volume 31, whereas other data is still waiting to be copied. *Kedem* keeps track of which is which by maintaining a write-pending flag for each cache slot. If the write-pending flag for a slot is set, it means the data in that slot needs to be copied, or “destaged,” to a logical volume 31. On the other hand, if the write-pending flag for a slot is cleared, it means that data in that slot is safely stored on a logical volume 31.

The use of the write-pending flag does not amount to determining whether the target location is one on which a database record is permitted to be stored.”

In the first place, according to claim 1, the “target location” must be on the logical device. But the write-pending flag provides information about a location in the cache memory, and not on the logical device.

⁴ *Kedem*, col 4, lines 50-59.

Secondly, the write-pending flag says nothing about whether a cache slot is one in which a database record may be stored. The write-pending flag merely tells the system whether the data in the cache slot has been destaged. It does not care what kind of data is in the cache slot. In particular, a set write-pending flag bars the writing of any data whatsoever to its associated cache slot. Similarly, a cleared write-pending flag permits the writing of any kind of data to its associated cache slot.

It is apparent therefore that *Kedem* fails to teach "determining whether the target location is one on which a database record is permitted to be stored."

As noted above, a section 102 rejection requires that each element be disclosed in the claim. In this case, *Kedem* fails to disclose both steps of claim 1. Accordingly, the section 102 rejection is improper and should be withdrawn.

Claims 2-8 depend on claim 1 and are therefore allowable for at least the same reasons as discussed in connection with claim 1.

Claim 16 recites limitations similar to claim 1 and is patentable for at least the same reasons.

Section 102 rejection of claim 14

Claim 14 recites a logical device in which each extent has

"a corresponding set of processing instructions associated therewith."

The Examiner states that this claim limitation is met by a discussion of setting locks and various flags associated with a particular track (see steps 130, 131 in FIG. 7). The Examiner draws particular attention to the following:

"Step 130 selects and locks the corresponding extents track in step 130 so that no additional changes may be made to that extents track. For each track in the destination device, step 131 performs a number of functions."⁵

The foregoing text merely describes setting and clearing locks. A track's lock is not a "set of processing instructions associated" with that track.

Applicant requests that the Examiner specifically identify what processing instructions a lock is believed to be associated with and to quote verbatim where *Kedem* teaches this association.

Claim 14 also recites

"information identifying each extent on the logical device and the processing instructions associated with that extent."

The Examiner suggests that *Kedem* teaches this limitation as follows:

"FIG. 8 depicts the operation of the copy program 84 shown in FIG. 1. In step 150 the source device controller 87 reads the extents track, such as the extents track 75 in FIG. 3. Step 151 uses the data from the extents track 75 to obtain the location of the initial destination track and step 152 identifies the destination device so these two items specifically locate the first destination track within the data storage facility 24 in FIG. 1."

The foregoing text appears to teach a way to find a destination track on a destination device. It is unclear, from the foregoing passage, just what processing instructions are associated with any particular track on the logical device.

In particular, Applicant notes that the extents track 75 from which data is read by the controller 87 is in the cache memory 27, and not on any logical device 31.⁶

⁵ *Kedem*, col. 8, lines 62-67.

⁶ *Kedem*, col. 3, lines 1-2 ("FIG. 3 is a still more detailed view of an extents track in the cache memory of FIG. 2.") [emphasis supplied].

As noted above, a section 102 rejection requires that each element be disclosed in the claim. In this case, *Kedem* fails to disclose either limitation of claim 14. Accordingly, the section 102 rejection is improper and should be withdrawn.

Claim 15 depends on claim 14 and is therefore allowable for at least the same reasons as discussed in connection with claim 14.

Section 102 rejection of claim 9

Claim 9 recites the step of

"determining that the processing instructions associated with all of the extents within the extent set can be executed."

The Examiner states that *Kedem* teaches this step in the following passage:

"However, as will become apparent, the process of step 97 can be repeated during a given session. Consequently, step 97 performs various housekeeping operations such as adding any new extents required by the new command or eliminating any as previously defined extents that are no longer valid."

This text merely states that the step of establishing an extent (see step 97, FIG. 5) can be repeated more than once. This has nothing to do with determining that processing instructions associated with an extent *can be executed*. The fact that step 97 can be repeated multiple times does not say anything about whether an instruction associated with an extent can or cannot be executed.

Claim 9 also recites the limitation of

"executing processing instructions consistent with the extent set associated with the target location."

The Examiner states that this step is disclosed in the following:

"For each track in the destination device, step 131 performs a number of functions."⁷

Step 131 involves setting and clearing various flags. This does not amount to the execution of "processing instructions consistent with the extent set associated with the target location." This is just a matter of clearing and setting flags.

Moreover, the flags being set and cleared in step 131 are flags in the cache memory 27 (see FIG. 2). This is not a "target location on a logical device" as required by claim 9.

It is apparent that *Kedem* fails to teach each and every limitation of claim 9. Accordingly, the section 102 rejection of claim 9 is improper.

Claims 10-13 depend on claim 9 and are therefore allowable for at least the same reasons discussed above in connection with claim 9.

Claim 17 recites limitations similar to claim 9 and is patentable for at least the same reasons.

Section 102 rejection of claim 2

Claim 2 recites the additional limitation that maintaining information identifying extents designated for storage of database records includes:

"maintaining an extent table having extent table entries identifying properties associated with the extent"

The Examiner draws attention to *Kedem*, col. 4, lines 62-67 and col. 5, lines 1-11 as teaching this claim limitation.

However, the cited text merely describes device headers with entries for each logical device, and headers for each cylinder in a device. These headers do not in any way restrict what type of data can be written to a cylinder on a logical device. These headers therefore do not identify locations, or extents, that are designated specifically for storage of database records.

⁷ *Kedem*, col. 8, lines 65-67.

Section 102 rejection of claim 3

Claim 3 recites

"selecting the properties to include information identifying a set of data verification steps to be carried out when data is written into the extent"

The Examiner draws attention to a password entry 104. But this password entry 104 appears to be for verifying a request to write data. This is not the same as verifying the data itself. One might verify the authenticity of a request to write certain data, but this would be different from verifying that that data was indeed written, and not a corrupted version of that data.

Applicant points out that the claim says "data verification" and not "request verification."

Section 102 rejection of claim 4

Claim 4 recites the additional limitation of

"identifying the logical device to be a logical device on which database records are to be written"

The Examiner draws attention to a discussion of clearing the PB bit in a source device and clearing the IND bit in the destination device. This operation does not depend on what type of data is being written to the destination device. And in particular, neither clearing the B bit nor IND bit has anything to do with identifying a destination device as being one on which database records are to be written.

Section 102 rejection of claim 5

Claim 5 recites the additional limitation of "identifying a set of data verification steps to be carried out in connection with writing data to an extent."

The Examiner states that *Kedem* teaches this limitation in col. 9, lines 22-30, which is a discussion about updating a CRC field and setting an extents track to be write-pending.

Neither of these operations involve identifying a set of data verifications steps. The steps associated with updating a CRC field are carried out for every write operation, and therefore

never need to be identified. Setting a write-pending flag merely marks a track as not yet having been destaged from cache memory 27 to a logical device 31. This has nothing to do with data verification.

Section 102 rejection of claim 6

Claim 6 recites the additional limitation of actually "carrying out the data verification steps" that were identified in claim 5.

The Examiner suggests this claim limitation is taught by *Kedem's* disclosure that

"[a]ny of a number of other tests may also be performed to verify the context and content of the system call. Assuming verification, control passes to step 124 wherein the host adapter locks the destination device such as the DEST A device 31. In step 125 the host adapter controller 86 places an ATTN signal in a request buffer for the source device, such as an ATTN flag in the request buffer 72 shown in FIG. 2. Step 126 forms the request record for effecting the data transfer to the destination device. The request record has the data structure shown in FIG. 4 and includes the source device number in block or field 81, the record number of the starting extent in block or field 82 and the record number of the ending extent in block or field 83."⁸

This text has nothing to do with either updating the CRC field or setting write-pending flags as discussed by the text cited in connection with claim 5. Hence, it is unclear how this can teach the actual execution of alleged "data verification steps" identified in the passage cited in connection with claim 5.

The above text refers to tests to verify "context and content of the system call." This has nothing to do with verification of actual data. The rest of the text refers again to setting various flags and for creating a request record for causing the data transfer. Neither of these operations involve carrying out data verification steps.

Section 102 rejection of claim 7

Claim 7 recites the additional limitation of "determining that [a] target location is contained completely within an extent."

⁸ *Kedem*, col. 8, lines 45-58.

The Examiner states that this limitation is disclosed by *Kedem* in the following:

"Once all this information has been transferred to the track ID tables associated with the destination device, the protection bits in the session column are set for each track on the entire extent in step 135 for the source device."⁹

However, this passage refers to an extent on the source device, and not on the target device. This is therefore inconsistent with claim 7, which refers to the "target location."

Section 102 rejection of claim 11

The Examiner draws attention to FIG. 11 step 211, in which the host application indicates that the operation of writing the extents track to the cache memory 27 is complete (see step 210).

Claim 11 recites verifying that the write to a *target location* was successful. According to claim 9, from which claim 11 depends, the target location is "on the storage device." But in construing claim 9, the "storage device" has already been designated to be the destination device 33, which is different from the cache memory 27. Therefore, steps 210 and 211, which refer to an operation on the cache memory 27, have nothing to do with the "target location on the storage device."

Summary

That only selected arguments have been propounded and only selected claims have been discussed is not to be regarded as an admission that no other arguments exist in support of patentability, or that claims not specifically discussed are admitted as unpatentable.

Now pending in this application are claims 1-17, of which claims 1, 9, 14, 16, and 17 are independent. An extension fee with an accompanying petition for extension of time is enclosed. No additional fees are believed to be due in connection with the filing of this response. However, to the extent fees are due, or if a refund is forthcoming, please adjust our deposit account 06-1050, referencing attorney docket "07072-159001."

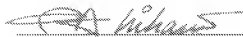
⁹ *Kedem*, col. 9, lines 17-20.

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Respectfully submitted,

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